

# INSTRUMENT

BEAM LINE

# 18

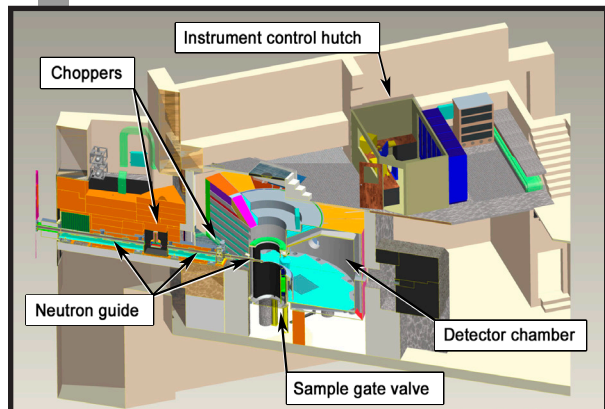
SPALLATION NEUTRON SOURCE

# Fact Sheet



## ARCS – WIDE ANGULAR-RANGE CHOPPER SPECTROMETER

ARCS is optimized to provide a high neutron flux at the sample and a large solid angle of detector coverage. This spectrometer is capable of selecting incident energies over the full energy spectrum of neutrons, making it useful for studies of excitations from a few to several hundred milli-electron volts. An elliptically shaped supermirror guide in the incident flight path boosts the performance at the lower end of this range. The sample and detector vacuum chambers provide a window-free final flightpath and incorporate a large gate valve to allow rapid sample changeout. A new type of neutron  $T_0$  chopper blocks prompt radiation from the source and eliminates unwanted neutrons.



*Cutaway view of the engineering model of the ARCS instrument showing the incident beam line components, sample and detector chamber, and control area.*

### APPLICATIONS

The increased sensitivity of ARCS offers new opportunities for scientific studies in the following:

#### Lattice Dynamics

- Entropy and the effects of vibrational modes on stability and phase transitions of solids
- Excitations in disordered materials; effects of nanoscale features on vibrational entropy and thermodynamic stability
- Equations-of-state from the measured phonon density-of-states versus temperature and pressure
- Phonons in correlated-electron materials; coupling of lattice and electronic degrees of freedom in high- $T_c$ , heavy-fermion, and mixed-valence materials

#### Magnetic Dynamics

- High-temperature superconductivity—spin dynamics in superconductors and precursor compounds and crystal field spectroscopy
- Low-dimensional systems; one-dimensional quantum magnets and low-dimensional conductors
- Magnetism in actinide materials; heavy-fermion magnetism and superconductivity

#### Chemical Physics

- Deep inelastic neutron scattering studies of hydrogen and helium.

### SPECIFICATIONS

Moderator	Decoupled ambient water
Source-to-Fermi chopper distance	11.6 m
Chopper-to-sample distance	2.0 m
Sample-to-detector distance	3.0 to 3.4 m cylindrical geometry
Incident energy range	20–1500 meV
Resolution (elastic)	2–5% $E_i$
Detector coverage horizontal	-28–135°
Detector coverage vertical	-27–26°
Minimum detector angle	3°

Status: Operational

### FOR MORE INFORMATION, CONTACT

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<http://neutrons.ornl.gov/instruments/SNS/ARCS>



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